certain quantity of the ground is carried along with it, and, on measuring the mark, it has, under such circumstances, been ascertained, to be some lines longer than the sole of the boot.

M. Mascart is continuing his investigations of this subject.—*Bulletin de l'Academie Royale de Médecine de Belge*, November, 1843.

77. *Chossat on Starvation.*—The experimental researches of this author obtained for him the gold medal for Experimental Physiology in 1841, from the Royal Academy of Sciences of Paris. His Memoirs, published in 1843, contains numerous facts and important inferences bearing on physiology, pathology, and therapeutics. I shall, however, confine myself to those which immediately concern the subject of legal medicine.

M. Chossat's experiments were made on pigeons, turtle-doves, common fowls, guinea pigs, rabbits, and several of the cold-blooded animals, as frogs, tortoises, serpents, &c.

Forty-eight warm-blooded animals of all the species were totally deprived of food and drink, and the first important point ascertained was the constant but gradual diminution of weight. If the loss of the first day be abstracted, the loss of weight till towards the close of life was nearly the same each day. The first day always exhibited a greater amount of loss, in consequence of the bowels evacuating the remains of the last food. All things being otherwise equal, and taking a period equally distant from the hour at which inanition began, the loss was great in proportion to the bulk of the body. Towards the end of life, an increased amount of diurnal loss in weight was observed—a circumstance attributable to the increased amount of alvine evacuations, or even smart diarrhœa, which often then occurred.

One of the most interesting points ascertained by M. Chossat was the absolute average amount of weight lost before death took place. The average result of all his experiments, whether with fat or lean animals, showed that before death ensued the weight of the body was reduced four-tenths of what it had been when they were shut up to be starved. And when this occurs death ensues. But it may be modified by circumstances. Thus, if the animal be loaded with fat, it sometimes lives till it has lost five-tenths, or one-half, of its weight. Age, also, exerts a powerful modifying influence. Very young animals often die after losing only two-tenths of their weight, and the loss in them never exceeds four-tenths.

The time which an animal, deprived of all sustenance, will live, varies much. In birds and mammalia, the average duration of life under starvation was nine days. The maximum, however, was twenty days and a half, and the minimum was a little more than two days. Here, again, age exerted a powerful modifying influence. In very young animals death occurred by the end of the second day, while, in adult animals, the average duration of life was from fifteen to eighteen days. It is, however, a remarkable circumstance that the longer life was prolonged, or to be prolonged, the less was the amount of daily loss, and the sooner death occurred, the more rapid was the diurnal loss of weight.

In the case of reptiles and fishes, the experiments proved that they died when they had lost the same proportional amount of weight as the birds and quadrupeds. They lived, however, much longer, as their nutritive movement is much slower. In general, they lived twenty-three times as long again.

The next series of experiments, undertaken by M. Chossat, was conducted on the principle of allowing a very insufficient quantity of food. For some animals there was given a very limited supply of both food and drink; to others, insufficient solid food alone; and to a third, water only.

In the first series it was singular to remark, that, when they died, their loss of weight was found to be very nearly the same as if they had been totally deprived of food. The duration of life was, however, nearly double.

A supply of water seemed to prolong life in reptiles, and somewhat lengthened it in quadrupeds, but had no influence on that of birds. The water, however, must be voluntarily taken, since, if forced to swallow a quantity equal to their daily loss of weight, their lives were shortened.

As animals killed by starvation thus lose four-tenths of their weight, it became a matter of importance to ascertain what organs of the body had been chiefly attacked to supply this loss. The fat of course first disappears, but this is not an essential organ. It is the muscular system, and the heart in particular, which bears almost the whole loss. Hence, a softened state of the muscular system. The nervous system appeared to have lost none of its original volume or weight, though every other organ of the body was reduced both in volume or weight.

The animal heat falls rapidly in animals that are starved, and death occurs in warm-blooded animals when the temperature falls as low as 76° 81 Fahrenheit. This is the temperature at which animals die which are plunged in refrigerant mixtures, and we may, therefore, infer that death ensues in consequence of the cooling of the body below what is sufficient for the purpose of life.

Symptoms of Starvation.—The animal remains calm from the beginning of the experiment till the half of the period which they live, or nearly the whole period is expired. After this, they become more or less agitated; and this state continues as long as the animal heat keeps tolerably high. On the last day, they fall into a state of stupor, attended with a rapidly increasing weakness. The animal shakes when it stands, and seems giddy; the feet are cold and livid, and contracted like a ball. The respiration becomes more and more feeble and slow; the sensibility diminishes; the pupil of the eye dilates, and the animal dies, sometimes tranquilly, sometimes after a few spasms, or convulsive movements of the wings, or opisthotonos of the body.

The feculent discharges were, as already stated, copious on the first day, being the remains of the food previously taken, but were small in quantity afterwards. During the last three days of life, however, they augmented in quantity, and presented the appearance of colliquative diarrhœa. The weight of these feculent discharges, was intimately connected with the diurnal loss of weight, and with the exception of the age, nothing appeared to possess a greater influence on the probable duration of life than the nature and quantity of this discharge; the duration of life and the quantity evacuated were always in the inverse ratio of one another.

The cerebral functions seem to remain entire till towards the end of life.

As M. Chossat's experiments led him to conclude that death eventually occurs from the cooling of the body below what is necessary for life, he was also induced to inquire whether an animal, just expiring, could be brought back to life and strength, if it were plunged into an elevated temperature. The result was a favourable one. When placed in a heated stove, the animals gradually, but slowly revived. The appetite returned, but digestion did not take place unless the temperature was kept up at its elevated point. This last, however, gradually regained its power, and thus the natural animal heat was restored. There were, however, exceptions to this, the animal dying, notwithstanding his partial recovery, after successive attacks of convulsions.—*Condensed from the Edin. Med. and Surg. Journ.*, No. 158, and *Annales D'Hygiène*, No. 60.

T. R. B.

78. *Sudden death from a Mechanical Cause.*—The following case is valuable as showing the necessity of a medico-legal investigation in every instance of sudden death.

Dr. Jackson, of Leith, was sent for at 3 A.M., to visit a person who was said to be either dead or in a fit. He found him dead. The countenance was pale, with a haggard expression, and the pupils were dilated. On looking into the mouth, a small quantity of matter, evidently ejected from the stomach, was seen lying on the tongue.

The deceased had been very intemperate. He had dined the day previous, on boiled potatoes, with broth, and in the afternoon, drank a quantity of overproof spirits, and which indeed was considered to be the cause of his death. In